

The claims:

- 1) Coded data for disposal on or in a surface, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, and having mirror symmetry, the layout including:
 - (k) n identical first sub-layouts rotated $1/n$ revolutions apart about the center of rotation, and,
 - (l) n identical second sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each second sub-layout being a reflection of a corresponding one of the first sub-layouts, at least one sub-layout including:
 - (i) rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout; and,
 - (ii) reflection-indicating data that distinguishes the reflection of that sub-layout from the reflection of a corresponding reflected sub-layout.
- 10 2) The coded data of claim 1, each second sub-layout being a reflection of a corresponding first sub-layout about a symmetry axis, the symmetry axis passing through the center of rotation.
- 15 3) The coded data of claim 1, the rotation-indicating data of each sub-layout being adapted to distinguish the rotation of the sub-layout from the rotation of each other sub-layout.
- 20 4) The coded data of claim 1, the reflection-indicating data being adapted to distinguish the reflection of a respective sub-layout from the reflection of each other sub-layout within the layout.
- 25 5) The coded data of claim 1, the coded data being redundantly encoded.
- 6) The coded data of claim 5, the coded data being redundantly encoded using Reed-Solomon encoding.
- 7) The coded data of claim 1, the coded data including at least one codeword associated with each layout, the codeword being encoded in each sub-layout.
- 30 8) The coded data of claim 1, the coded data including a plurality of layouts, each layout having at least one codeword that is different to at least one codeword of at least one other layout.
- 9) The coded data of claim 1, the coded data including a plurality of layouts, each layout having at least one codeword that is identical to at least one codeword of at least one other layout.
- 35 10) The coded data of claim 1, each sub-layout having at least one codeword that is different to at least one codeword of at least one other sub-layout.

- 11) The coded data of claim 1, each sub-layout having at least one codeword that is identical to at least one codeword of at least one other sub-layout.
- 5 12) The coded data of claim 1, each sub-layout having a codeword formed from a number of data elements, each sub-layout defining the positions of the data elements.
- 13) The coded data of claim 12, the sub-layouts being arranged such that each data element has a unique position.
- 10 14) The coded data of claim 12, the positions of the data elements of respective sub-layouts being interleaved.
- 15) The coded data of claim 1, the layout having at least one of the following shapes:
 - (a) linear;
 - (b) square;
 - (c) rectangular;
 - (d) triangular; or
 - (e) hexagonal.
- 20 16) The coded data of claim 1, each layout including at least one target feature.
- 17) The coded data of claim 16, the at least one target feature being used to determine at least one of the location of the layout and rotation of the layout.
- 25 18) The coded data of claim 16, the coded data being adapted to be sensed using a sensing device, the target feature being configured to enable perspective correction of the coded data as sensed by the sensing device.
- 30 19) The coded data of claim 16, each layout including at least four target features.
- 20) The coded data of claim 16, the coded data including a plurality of layouts, at least some target features being common to at least two layouts.
- 35 21) The coded data of claim 1, the coded data including a plurality of layouts arranged over the surface in accordance with a super-layout.
- 22) The coded data of claim 21, the super-layout being arranged such that there is a predetermined spacing between adjacent layouts in the super-layout.

23) A surface bearing machine-readable coded data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, and having mirror symmetry, the layout including:

- 5 (a) n identical first sub-layouts rotated $1/n$ revolutions apart about the center of rotation, and,
 (b) n identical second sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each second sub-layout being a reflection of a corresponding one of the first sub-layouts, at least one sub-layout including:
10 (i) rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout; and,
 (ii) reflection-indicating data that distinguishes the reflection of that sub-layout from the reflection of a corresponding reflected sub-layout.

24) A surface according to claim 23, the coded data being substantially invisible to the unaided human eye.

- 15 25) A surface according to claim 23, the surface further including additional visible markings.

26) A surface according to claim 23, the surface being configured as an interface surface for enabling user interaction with a computer.

- 20 27) A surface according to claim 23, the surface including at least one region and the coded data representing an identity of the at least one region.

28) A method of generating an interface surface, the method including the steps of:

- 25 (a) receiving user data in a printer;
 (b) generating machine-readable coded data incorporating the user data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, and having mirror symmetry, the layout including:
30 (i) n identical first sub-layouts rotated $1/n$ revolutions apart about the center of rotation, and,
 (ii) n identical second sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each second sub-layout being a reflection of a corresponding one of the first sub-layouts, at least one sub-layout including:
 (1) rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout; and,
 (2) reflection-indicating data that distinguishes the reflection of that sub-layout from the reflection of a corresponding reflected sub-layout.
35 (c) printing the coded data onto a surface.

29) A method according to claim 28, the coded data being substantially invisible to the unaided human eye.

- 30) A method according to claim 28, the surface further including additional visible markings, the method including printing visible markings on the surface substantially simultaneously with the coded data.
- 5 31) A method of using a sensing device to read machine-readable coded data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, and having mirror symmetry, the layout including:
- (i) n identical first sub-layouts rotated $1/n$ revolutions apart about the center of rotation, and,
- (ii) n identical second sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each second sub-layout being a reflection of a corresponding one of the first sub-layouts, at least one sub-layout including:
- 10 (1) rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout; and,
- (2) reflection-indicating data that distinguishes the reflection of that sub-layout from the reflection of a corresponding reflected sub-layout.
- 15 (b) sensing at least one layout using the sensing device;
- (c) decoding the coded data of at least one of the sub-layouts of the sensed layout, thereby determining at least the rotation-indicating data of that sub-layout; and
- (d) using the rotation-indicating data to interpret the meaning of at least some of the coded data.
- 20 32) A method according to claim 31, each layout including at least one target feature representing at least a position and a rotation of the layout, the method of reading the coded data including:
- (a) imaging the surface to generate an image thereof;
- (b) processing the image to locate one or more target features; and
- 25 (c) on the basis of the located target features, determining at least one of the position and the rotation of at least one of the sub-layouts.
- 30 33) A method according to claim 31, each layout including a codeword, the codeword being encoded in each sub-layout, the method including decoding the codeword from at least one of the sub-layouts.
- 34) A method according to claim 31, at least one sub-layout including type-indicating data, the method including:
- (a) determining at least the type-indicating data of the at least one sub-layout; and,
- (b) using the type-indicating data to interpret the meaning of at least some of the coded data.
- 35 35) Coded data for disposal on or in a surface, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, the layout including n identical sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each sub-layout encoding a codeword formed from a number of data elements, the sub-layout defining the

position of the data elements, and including rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout.

- 36) The coded data of claim 35, the sub-layouts being arranged such that each data element has a unique
5 position.
- 37) The coded data of claim 35, the positions of the data elements of respective sub-layouts being interleaved.
- 10 38) The coded data of claim 35, the coded data including a plurality of layouts, each layout having at least one codeword that is different to at least one codeword of at least one other layout.
- 39) The coded data of claim 35, the coded data including a plurality of layouts, each layout having at least one codeword that is identical to at least one codeword of at least one other layout.
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- 40) The coded data of claim 35, each sub-layout having at least one codeword that is different to at least one codeword of at least one other sub-layout.
- 20 41) The coded data of claim 35, each sub-layout having at least one codeword that is identical to at least one codeword of at least one other sub-layout.
- 42) The coded data of claim 35, the coded data being coded data according to claim 1.
- 25 43) A surface bearing machine-readable coded data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, the layout including n identical sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each sub-layout encoding a codeword formed from a number of data elements, the sub-layout defining the position of the data elements, and including rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout.
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- 44) A surface according to claim 43, the coded data being substantially invisible to the unaided human eye.
- 45) A surface according to claim 43, the surface further including additional visible markings.
- 35 46) A surface according to claim 43, the surface being configured as an interface surface for enabling user interaction with a computer.
- 47) A surface according to claim 46, the surface including at least one region and the coded data representing an identity of the at least one region.

48) A surface according to claim 46, the surface being a surface according to claim 23.

49) A method of generating an interface surface, the method including the steps of:

- 5 (a) receiving user data in a printer;
- (b) generating machine-readable coded data incorporating the user data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, the layout including n identical sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each sub-layout encoding a codeword formed from a number of data elements, the sub-layout defining the position of the data elements, and including rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout.
- 10 (c) printing the coded data onto a surface.

50) A method according to claim 49, the coded data being substantially invisible to the unaided human eye.

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51) A method according to claim 49, the surface further including additional visible markings, the method including printing visible markings on the surface substantially simultaneously with the coded data.

52) A method according to claim 49, the method being a method according to claim 28.

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53) A method of using a sensing device to read machine-readable coded data, the coded data being arranged in accordance with at least one layout having n -fold rotational symmetry about a center of rotation, where n is at least two, the layout including n identical sub-layouts rotated $1/n$ revolutions apart about the center of rotation, each sub-layout encoding a codeword formed from a number of data elements, the sub-layout defining the position of the data elements, and including rotation-indicating data that distinguishes that sub-layout from at least one other sub-layout.

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- (a) sensing at least one layout using the sensing device;
- (b) decoding the coded data of at least one of the sub-layouts of the sensed layout, thereby determining at least the rotation-indicating data of that sub-layout; and

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- (c) using the rotation-indicating data to interpret the meaning of at least some of the coded data.

54) A method according to claim 53, each layout including at least one target feature representing at least a position and a rotation of the layout, the method of reading the coded data including:

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- (a) imaging the surface to generate an image thereof;
- (b) processing the image to locate one or more target features; and
- (c) on the basis of the located target features, determining at least one of the position and the rotation of at least one of the sub-layouts.

- 55) A method according to claim 53, each layout including a codeword, the codeword being encoded in each sub-layout, the method including decoding the codeword from at least one of the sub-layouts.
- 56) A method according to claim 53, at least one sub-layout including type-indicating data, the method including:
- (a) determining at least the type-indicating data of the at least one sub-layout; and,
 - (b) using the type-indicating data to interpret the meaning of at least some of the coded data.
- 57) A method according to claim 53, the method being a method according to claim 31.

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